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INTERNATIONAL BULLETIN OF BACTERIOLOGICAL NOMENCLATURE AND TAXONOMY

Volume 7 October 15, 1957 No. 4

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Volume 7 October 15, 1957 No. 4

THE BIOCHEMICAL REACTIONS GIVEN BY MEMBERS OF THE SERRATIA GROUP

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The purpose of this paper is to report the results of investigations into the biochemical reactions given by members of the Serratia group. Available descriptions of this group of microorganisms are inadequate, and often are inaccurate, hence, these studies were instituted in an attempt to characterize members of the group as fully as possible.

Fifty strains were employed in the investigations, 16 of which also were used by Davis and Woodward (1957) in their study of the O antigens of members of the Serratia group. The sources of the cultures were as follows:

Blood	9
Wounds, abscesses	7
Sputa, throats, bronchial washings	12
Urine	7
Kidney	1
Lung	1
Brain (cow)	1
Paracentesis	1
Synovial fluid	1
Spinal fluid	1
Feces	3
Aerial contaminant	1
Flies	1
Stock culture collections	2
Unknown sources	2

The methods employed in the study of the biochemical activities of the cultures were similar to those recommended by Kauffmann (1954) and by Edwards and Ewing (1955).[1] Lysine decarboxylation was determined by the ninhydrin method, details of which were given by Carlquist (1956) and by Edwards, Fife, and Ewing (1956). Leifson's malonate broth with added yeast extract was used for determination of malonate utilization and tests for production of phenylpyruvic acid (PPA) from phenylalanine (PA) were made by the PA agar method (Ewing, Davis, and Reavis, in press). Pigment formation was determined following incubation of the cultures on infusion agar slants and in motility medium at 25 C and at 37 C. Pigment production also was assessed after the strains had been maintained at 22 to 26 C in cork stoppered stock culture tubes (infusion agar) for one week. The biochemical reactions of pigmented strains were repeated with colorless variants selected from platings in those instances where pigment interfered with interpretation of results. Gelatin liquefaction was determined after incubation at 25 C. However, these tests may be incubated at 37 C and followed by refrigeration, if desired.

The serologic methods used in the preliminary investigations reported herein were similar to those employed in Escherichia coli work. (See Ewing et al., 1956, for details and references).

The results obtained with 50 strains belonging to the Serratia group are summarized in Table 1. Attention should be directed to several important aspects of the reactions given by these cultures. Gas was produced by 32 strains (64 per cent) but the volume of gas was very small, constituting 5 per cent or less of the volume of the insert tubes. Only one strain produced acid from lactose avidly and within 24 hours incubation and this same strain also rapidly fermented raffinose and arabinose. Twenty-nine other cultures produced a slightly acid reaction in lactose tubes after 5 to 21 days. Sucrose, maltose, mannitol, and salicin were utilized within 24 hours by all strains and all except two fermented sorbitol. All cultures failed to utilize dulcitol or rhamnose and only two produced acid from raffinose. The majority of the strains failed to hydrolyze urea but 18 produced weak

[1] A mimeographed outline of methods is available upon request.

reactions on urea agar after 4 or 5 days at 37 C. None of the cultures produced hydrogen sulfide in triple sugar iron (TSI) agar in the usual incubation period but more than half of the tubes showed evidence of very slight hydrogen sulfide formation after 5 to 7 days incubation at 37 C. Only one strain failed to liquefy gelatin in 24 hours or less, two failed to show evidence of amine formation from lysine, and two failed to grow in KCN medium. All of the cultures were malonate negative and all except five failed to show evidence of production of PPA from PA. These five strains gave weak color reactions when tested with ferric chloride reagent after incubation for 20 to 22 hours on PA agar medium. Only 16, or 32 per cent, of the group of cultures under investigation produced pink or red pigment. All strains grew well at both 22 and 37 C and pigment was formed at both temperatures by those cultures in which pigment production was observed.

Differentiation of members of the Serratia group from other Enterobacteriaceae was possible if the above-mentioned characteristics were taken into consideration. The IMViC reactions (--++) given by members of the Serratia group distinguished them from strains belonging to the Salmonella, Arizona, Citrobacter (Escherichia freundii), Shigella, and Escherichia groups and indicated that the Serratia group should be placed near the Klebsiella, Aerobacter (Cloaca), and Hafnia groups in the Enterobacteriaceae schema. Members of the Serratia group may be separated from Klebsiella on the basis of their motility, failure to utilize malonate, slowness and reluctance to ferment lactose, slight delayed, or negative urease reactions, gelatin liquefaction, and by the small volumes of gas produced by aerogenic cultures (Table 2). They may be distinguished from members of the Aerobacter (Cloaca) group by their rapid liquefaction of gelatin, reluctance to produce acid from lactose, failure to utilize malonate, and by the small volumes of gas produced from fermentable substrates (Table 2). Serratia strains may be differentiated from those belonging to the Hafnia group by negative methyl red tests at 37 C, by rapid liquefaction of gelatin, and by the small volumes of gas produced by aerogenic cultures (Table 2). Sorbitol fermentation also served to differentiate between members of these two groups, since the majority of Serratia strains produced acid from this substance, whereas known members of the Hafnia group did not utilize it. Proteus mirabilis cultures, if urease negative and Voges-Proskauer

positive, may be differentiated from members of the Serratia group by means of PPA production, positive methyl red tests, hydrogen sulfide production within 24 to 48 hours, and failure to produce acid from mannitol. When present, pink or red pigment served to distinguish between members of the Serratia group and members of all the other groups mentioned above.

Members of the Serratia group and Erwinia strains also must be differentiated, since several species of the latter appeared to be similar to Enterobacteriaceae in many of their characteristics.[1] Serratia strains, as well as other Enterobacteriaceae, and certain Erwinia species may be differentiated on the basis of nitrate reduction, since some species of the latter failed to reduce nitrate. Many of the nitrate negative species also differed from Enterobacteriaceae in their general growth characteristics. The nitrate positive Erwinia species and Serratia group strains may be differentiated by means of various combinations of the following reactions given by these Erwiniae: the majority of strains fermented lactose rapidly and avidly, gelatin was liquefied slowly by some cultures while others were gelatin negative, some strains were methyl red positive and Voges-Proskauer negative, gas volumes were larger than those produced by Serratia strains, and nonmotile forms were common.

Antigen suspensions prepared from the above-mentioned 50 Serratia group cultures were tested in O antisera prepared with representatives of each of the six O antigen groups delineated by Davis and Woodward (1957). The results of these studies (Table 3) indicated that it was possible to determine the O antigen group of 47 of the 50 strains with these six antisera. Living suspensions prepared from many of the strains were agglutinable in O antisera but some were inagglutinable, indicating the probable presence of K antigen.

Further studies on the O and H antigens of the Serratia group are in progress with a view to the eventual establish-

[1] Representative cultures of the various Erwinia species were received for comparative studies through the courtesy of Drs. D. D. Sutton and M. P. Starr, of the University of California, Davis.

ment of an antigenic schema and to facilitate the study of intra and intergroup relationships.

COMMENT

Cultures that belong to the Serratia group often constitute a diagnostic problem and it is probable that nonpigmented strains often are mistakenly identified as Aerobacter cloacae (Cloaca cloacae), as members of the Hafnia group, as intermediate coliform bacteria, or possibly as urease negative P. mirabilis. The results of the biochemical studies reported herein indicated that the strains investigated composed a homogeneous group. Parenthetically, it may be added that the results of preliminary serological studies also attested to the homogeneity of the group, since it was possible to determine the O antigen group of 47 of the 50 strains with only six antisera. Although the number of cultures studied was small, they were considered as fairly representative of the group, since they originated in a variety of sources and were collected from widely separated areas. Hence, it was felt that the following characterization or definition of the Serratia group based upon the reactions given by the majority of cultures, was justified.

Gram negative bacteria that conform to the definition of the family Enterobacteriaceae. Some strains produce pink or red pigment. Biochemical characters:

Glucose	+
Gas	d (when gas is formed, volumes are small, 5 per cent or less)
Lactose	- (or + weak and delayed)
Sucrose	+
Maltose	+
Mannitol	+
Dulcitol	-
Rhamnose	-
Arabinose	-
Inositol	d
Xylose	d
Raffinose	-
Sorbitol	+

Salicin	+	
Adonitol	d	
Trehalose	+	
Motility	+	
Simmons' citrate	+	
Christensen's citrate	+	
Urease	-	(occasionally + weak and delayed)
Indol	-	
MR	-	
VP	+	
H_2S (TSI)	-	(or + weak and delayed)
Nitrate	+	
Ammonia glucose	+	
Gelatin	+	
PA deaminase	-	
Malonate	-	
Lysine decarboxylation	+	weak
KCN	+	
Pigment	d	

Studies are being continued, as additional cultures are received, and it is possible that some changes in the above-mentioned characterization will be necessary in the future. In the meantime, it may be used as an aid in the differentiation of members of the Serratia group from other Enterobacteriaceae. This characterization or definition of the Serratia group also may be used in determining the position of the group, in relation to other groups, within the family Enterobacteriaceae. Members of this group differed from members of the Aerobacter (Cloaca) and Hafnia groups in several ways but they appeared to be more closely related to these groups than to any others. Hence, the writers would locate the Serratia group near the Aerobacter (Cloaca) and Hafnia groups.

Several species of Serratia have been described (see e.g. Bergey's Manual, 6th Ed., 1948) but the descriptions were inadequate, particularly as regards fermentative characteristics, and the differences between the species were slight. Thus, it seems that in the future it probably would be better to recognize only one species (S. marcescens) within the genus.

SUMMARY

The results of studies on the biochemical reactions of fifty Serratia group cultures indicated that the strains composed a homogeneous group. The characteristics of the group were enumerated and means by which members of the Serratia group may be differentiated from other Enterobacteriaceae were given. Forty-seven of the fifty cultures studied belonged to one or another of six previously described O antigen groups.

REFERENCES

1. Carlquist, P. R. 1956. A biochemical test for separating paracolon groups. Jour. Bact. 71:339.
2. Davis, B. R. and J. M. Woodward. 1957. Some relationships of the somatic antigens of a group of Serratia marcescens cultures. Canadian Jour. Microbiol. 3:591.
3. Edwards, P. R. and W. H. Ewing. 1955. Identification of Enterobacteriaceae. Burgess Publishing Co., Minneapolis, Minnesota.
4. _____, M. A. Fife, and W. H. Ewing. 1956. Newer biochemical methods in the recognition of shigellae and salmonellae. Amer. Jour. Med. Technol. 22:28.
5. Ewing, W. H., H. W. Tatum, B. R. Davis, and R. W. Reavis. 1956. Studies on the serology of the Escherichia coli group. CDC Monograph, Communicable Disease Center, Atlanta, Georgia.
6. _____, B. R. Davis and R. W. Reavis. Phenylalanine and malonate media and their use in enteric bacteriology. The Public Health Laboratory. In press.
7. Kauffmann, F. 1954. Enterobacteriaceae, 2nd Ed. Einar Munksgaard, Copenhagen.

TABLE 1

Summary of Results of Biochemical Tests with Fifty *Serratia* Group Cultures

Test	No. +	No. + delayed	No. -
Glucose	50	0	0
Gas	32	0	18
Lactose	1	29 w	20
Sucrose	50	0	0
Maltose	50	0	0
Mannitol	50	0	0
Dulcitol	0	0	50
Rhamnose	0	0	50
Arabinose	1	0	49
Inositol	31	16	3
Xylose	3	13	34
Raffinose	1	1	48
Sorbitol	48	0	2
Salicin	50	0	0
Adonitol	38	8 w	4
Trehalose	50	0	0
Motility	50	0	0
Simmons' citrate	50	0	0
Christensen's citrate	50	0	0
Urease	0	18 w	32
Indol	0	0	50
Methyl red	0	0	50
Voges-Proskauer	50	0	0
Hydrogen sulfide (TSI)	0	26 w	24
Nitrate reduction	50	0	0
Ammonia glucose agar	50	0	0
Gelatin (22 C.)	49	0	1
Phenylalanine deaminase	5 w	0	45
Malonate	0	0	50
Lysine decarboxylation	49 w	0	1
KCN	48	0	2
Pigment	16	0	34

w, weak; indicates slight, and often delayed, reactions.

TABLE 2

Group Differentiation by Biochemical Tests
(Reactions of Typical Cultures)

Biochemical Tests	Klebsiella-Aerobacter-Serratia Division				
	Klebsiella Group	Aerobacter (or Cloaca) Group	Hafnia Group 37 C	Hafnia Group 22 C	Serratia Group
Lactose	+	+	-	-	(+) or -
Methyl red	-	-	+	-	-
Voges-Proskauer	+	+	d	+	+
Hydrogen sulfide (TSI)	-	-	-	(+)	- or (+), 37 C
Urease	+*	d*	-	-	- or (+)*
Gelatin	-	(+)	-	-	+
Malonate	+	+	d	d	-
Motility	-	+	d	+	+
Gas	+	+	+	+	d**
Pigment	-	-	-	-	d

*, Urease reactions given by Klebsiella strains are not as rapid as those given by Proteus cultures and the majority of Aerobacter (Cloaca) strains are urease negative. Positive reactions given by members of either of these groups are more extensive and more rapid than those given by Serratia strains.

**, When gas is formed, volumes are small, 5 per cent or less.

+, Positive 1 or 2 days.

-, No reaction.

(+), Lactose fermented slowly and slightly, hydrogen sulfide produced slowly and in small amounts, or gelatin liquefied slowly.

d, Different biotypes.

TABLE 3

Distribution of Aerogenic, Anaerogenic, and Pigmented Serratia Strains among the O Antigen Groups

O Antigen Group	Pigment Only	Gas Only	Both Pigment and Gas	Neither Pigment nor Gas	Total
1		1			1
2		7		5	12
3		1	1	3	5
4	1	3		2	6
5		7	8	2	17
6	1		3	2	6
Undetermined			2	1	3
Total	2	19	14	15	50

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NOMENCLATURAL REVIEW

Ciferri, R. Type nomenclature of micro-organisms in culture. Abstracted from TAXON 6 (5):154. 1957.

The eminent mycologist, R. Ciferri, of the Italian Cryptogamic Laboratory of the University of Pavia, presented a paper at the International Congress of Microbiology in Rio de Janeiro, 1950. Unfortunately the proceedings of this Congress have not as yet appeared in print. A revision of this paper has appeared under the heading of News and Notes in TAXON. The author notes that there has been a great increase in interest in the categories, definitions, and nomenclature of types. He states that the recommendations of the International Code of Botanical Nomenclature, concerning the nomenclature of types, can rarely be applied to those micro-organisms which are usually grown in laboratory media. He suggests consideration of the following terminology. While the terms proposed may be regarded as especially appropriate to the fungi, they may have real application also in the field of microbiology, particularly bacteriology. Dr. Ciferri suggests the use of the abbreviation "cultypes" for the various possible categories of cultures of type status. The following definitions are somewhat paraphrased.

1. ARCHECULTYPE. A strain cultivated by the author of the name of the botanical taxon but lost or suffering an irreversible modification before an exhaustive study. The taxon cannot be recognized with reasonable certainty.

2. HOLOCULTYPE. A strain cultivated by the author of the name of the taxon, and the culture fully described and cited as type by the same taxonomist. The original strain is still maintained in culture without evident modification.

3. PARACULTYPE. A strain cultivated by the author of the name of the taxon and quoted in the original description, but not the selected holocultype.

4. SYNCULTYPE. Any strain cultivated by the author of the name of the taxon and quoted in the original description when a holotype has not been selected.

5. HOMOCULTYPE. A strain as far as possible identified with the archecultype, but from another source or isolate.

6. LECTOCULTYPE. A strain cultivated by the author of name of the taxon, and selected as holocultype by another student.

7. MEROCULTYPE. A strain derived from a mixed or impure (contaminated) holotype.

8. MONOCULTYPE. A monosporial (monogenetic or monocytogenetic) strain derived from the holotype.

9. METACULTYPE. A strain permanently modified but derived from the holocultype.

To the above there may be added:

10. GRAPHOCULTYPE. The first description or photograph or drawing of the holotype, in the absence of the culture.

11. THANATOCULTYPE. A dried or preserved, not living, specimen or a microscopic slide prepared from the holocultype.

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NEWS AND NOTES

NOMINATION OF U.S.S.R. MEMBERS TO THE INTERNATIONAL COMMITTEE ON BACTERIOLOGICAL NOMENCLATURE. Under date of February 5, 1957, Professor V. D. Timakov of the Academy of Medical Sciences, U.S.S.R., Moscow, on behalf of the Presidium of the Microbiological Society of the U.S.S.R., proposed the following individuals for membership in the International Committee on Bacteriological Nomenclature (of the International Association of Microbiological Societies).

1. Professor Dr. V. M. Zhdanov, Institute of Virusology, Academy of Medical Sciences, Moscow, U.S.S.R.

2. Professor Dr. N. A. Krassilnikov, Institute of Microbiology, Academy of Sciences, Moscow, U.S.S.R.

3. Professor Dr. V. L. Troitsky, Institute of Epidemiology and Microbiology, Academy of Medical Sciences, Moscow, U.S.S.R.

4. Professor Dr. V. L. Ryzhkov, Institute of Virusology, Academy of Medical Sciences, Moscow, U.S.S.R.

5. Professor Dr. G. V. Vygodtchikov, Institute of Epidemiology and Microbiology, Academy of Medical Sciences, Moscow, U.S.S.R.

Under the rules of the International Committee, these individuals have been accepted as members by its permanent secretary until final action can be taken by the International Committee at its 1958 meeting at Stockholm, Sweden.

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PROPOSAL TO CONSERVE THE FAMILY NAME ENTEROBACTERIACEAE AND TO DESIGNATE THE TYPE GENUS

EDITORIAL BOARD

The International Committee on Bacteriological Nomenclature, upon recommendation of the Judicial Commission, at its meeting in Rome (1953) placed the family name Bacteriaceae Cohn 1872 and the generic name Bacterium Ehrenberg 1928 in the list of rejected names (nomina rejicienda) authorized by the International Code of Nomenclature of the Bacteria and Viruses. This action was confirmed by the final Plenary Session of the International Association of Microbiological Societies (1).

Proposals were made at the Rome Congress to replace the family name Bacteriaceae Cohn 1872 by conservation of the family name Enterobacteriaceae Rahn 1937 and to replace the rejected generic name Bacterium Ehrenberg by conservation of the generic name Escherichia Castellani and Chalmers 1919, (type species Escherichia coli (Migula) Castellani and Chalmers 1919). However, the Permanent Secretary of the Judicial Commission and of the International Committee on Bacteriological Nomenclature can find no evidence in the records that any definite action was taken. Since the time of the meeting of the International Congress in Rome (1953) there has been wide spread acceptance and use of the family name Enterobacteriaceae by authors, by the Enterobacteriaceae subcommittee of the International Committee, by various bacteriological manuals, in abstracting journals, and in textbooks, due in part to the assumption that action had been taken conserving these names.

The Judicial Commission is in receipt of requests that appropriate action be taken.

Under the directives of Provision 5B of the International Code of Nomenclature of the Bacteria and Viruses the Judicial Commission is authorized (5B2) to issue OPINIONS when requested and (5B5) to establish lists of conserved names of the bacteria, including lists of conserved names of families (nomina conservanda familiarum) and of genera (nomina conservanda generum).

It has been requested that the family name Enterobacteriaceae Rahn 1937 be placed in the list of conserved family names, that the name of the type genus be designated

and conserved, and that the name of the type species be designated.

The Commissioners of the Judicial Commission are therefore being requested to approve or disapprove these several requests. The result of their vote will be published in the January issue (Vol. 8, No. 1.) of the INTERNATIONAL BULLETIN.

The directive of Provision 5B2 reads:

> In suitable cases an OPINION shall be prepared, which, if approved by eight or more commissioners shall be issued and published, becoming thereby available for the guidance of bacteriologists. All opinions are reported to the International Committee on Bacteriological Nomenclature, and unless rescinded by majority vote of this committee, such OPINIONS become final.

The Commissioners will be asked to vote approval or disapproval of the following statements:

(1). The family name Enterobacteriaceae Rahn 1937 shall be placed in the list of conserved family names (nomina conservanda familiarum).

(2). The type genus of Enterobacteriaceae is Escherichia Castellani and Chalmers 1919.

(3). The generic name Escherichia Castellani and Chalmers 1919 shall be placed in the list of conserved generic names (nomina conservanda generum).

(4). The type species of the genus Escherichia is Escherichia coli (Migula) Castellani and Chalmers 1919.

REFERENCE

(1). Minutes of the Meeting of the International Committee on Bacteriological Nomenclature held at Rome in Connection with the VI International Congress for Microbiology September, 1953. Meeting of the 7th. September. Int. Bull. Bact. Nom. and Tax. 3:159. 1953.

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MEMBERSHIP OF COMMITTEES, COMMISSIONS AND SUBCOMMITTEES, 1958

TENTATIVE LIST

There will be meetings of the International Committee on Bacteriological Nomenclature, of the Judicial Commission and of numerous subcommittees in connection with the International Microbiological Congress to be held under the auspices of the International Association of Microbiological Societies. These meetings will be held during the last week of July and the first week of August, 1958, at Stockholm, Sweden. If there are errors in this list as printed, please notify Dr. Cowan, the Permanent Secretary so that corrections may be made in the next issue of the BULLETIN.

INTERNATIONAL COMMITTEE ON BACTERIOLOGICAL NOMENCLATURE

Provision 4 of the International Bacteriological code of Nomenclature established a permanent International Committee on Bacteriological Nomenclature "so constituted that wherever practicable each country is represented by at least one member and no country by more than five. Nominations for membership are made preferably by one or more of the microbiological societies in each country."

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Provision 5 of the International Bacteriological Code of Nomenclature established a Judicial Commission to consist of fourteen members, twelve elected by the members of the International Committee on Bacteriological Nomenclature from its membership, together with the two Permanent Secretaries. The Commissioners are elected to serve in three classes of four Commissioners each, one class retiring at the close of the meeting of each Congress of the International Association of Microbiologists.

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Provision 4 of the International Bacteriological Code of Nomenclature authorized the appointment of subcommittees of experts to consider and report on the classification of special groups of microorganisms and on other phases of the taxonomy. Eight such taxonomic subcommittees have been appointed. In some cases, the subcommittees have designated groups of experts to study and report upon certain subdivisions of the taxa under consideration.

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